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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/670,000

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James M. Holden

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10/14/2005

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EXAMINER

KAO, CHIH CHENG G

ART UNIT

PAPER NUMBER

2882

DATE MAILED: 10/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/670,000

Applicant(s)

HOLDEN ET AL.

Examiner

Chih-Cheng Glen Kao

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 July 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 3-16 and 28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 3-16 and 28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 June 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Claim Objections

1. Claims 3, 7, 11-13, and 28 are objected to because of the following informalities, which appear to be minor draft errors including grammatical and lack of antecedent basis problems.

In the following format (location of objection; suggestion for correction), the following corrections may obviate their respective objections: (claim 3, line 6, “the zero order”; replacing “the zero” with - -a zeroth- -), (claim 3, lines 10-11, “said zero order”; replacing “zero” with - -zeroth- -), (claim 7, line 6, “the zero order”; replacing “the zero” with - -a zeroth- -), (claim 7, lines 10-11, “said zero order”; replacing “zero” with - -zeroth- -), (claim 11, line 6, “the zero order”; replacing “the zero” with - -a zeroth- -), (claim 11, lines 10-11, “said zero order”; replacing “zero” with - -zeroth- -), (claim 12, line 6, “the zero order”; replacing “the zero” with - -a zeroth- -), (claim 12, lines 10-11, “said zero order”; replacing “zero” with - -zeroth- -), (claim 13, line 7, “the zero order”; replacing “the zero” with - -a zeroth- -), (claim 28, line 7, “the zero order”; replacing “the zero” with - -a zeroth- -), and (claim 28, lines 12-13, “the zero order”; replacing “zero” with - -zeroth- -).

For purposes of examination, the claims have been treated as such. Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 3, 5, 9, 10, 13, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosencwaig et al. (US Patent 5596406) in view of Finarov et al. (US Patent 6657736) and Scheiner et al. (US Patent 6100985).

3. Regarding claims 3 and 13, Rosencwaig et al. discloses an apparatus and method comprising a radiation source emitting broadband radiation (fig. 2, #32), a rotating polarizing element with radiation passing through the polarizing element toward a sample (fig. 2, #122), said radiation being normally incident on and reflected off said sample (fig. 2), said reflected radiation passing through a rotating polarizing element (fig. 2, #132), at least one of the polarizing element and sample being rotatable to produce relative rotation (fig. 2, #122), and a spectrograph that detects the intensity at a plurality of polarization orientations (fig. 2, #64).

However, Rosencwaig et al. does not disclose zeroth order reflected radiation passing through a polarizing element, a computer system with at least one computer and program to extract spectral information, constructing an optical model, calculating spectral information for the optical model, and curve fitting the calculated and extracted spectral information to determine one or more parameters of a diffracting structure on a sample.

Finarov et al. teaches zeroth order reflected radiation passing through a polarizing element (fig. 3, #13). Scheiner et al. teaches a computer system with at least one computer and program (fig. 2, #20) for extracting spectral information (fig. 5a, #54), constructing an optical model (col. 11, lines 54-55), calculating spectral information for the optical model (fig. 5a, #56),

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and curve fitting the calculated and extracted spectral information to determine one or more parameters of a diffracting structure on a sample (fig. 5a, #58, 60, and 62).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the apparatus and method of Rosencwaig et al. with the polarizing element of Finarov et al., since one would be motivated to make such a modification to save costs and space (col. 10, lines 6-10) as shown by Finarov et al.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the apparatus of Rosencwaig et al. with the computer program for analysis of Scheiner et al., since one would be motivated to make such a modification for providing a system that enables the relative small amount of information representative of the structure's conditions to be obtained and successfully processed for even more complicated structures (col. 2, lines 34-38) as shown by Scheiner et al.

4. Regarding claim 5, Rosencwaig et al. as modified above suggests an apparatus as recited above.

However, Rosencwaig et al. does not disclose curve fitting comprising comparing extracted and calculated spectral information, adjusting at least one variable parameter of the model, recalculating spectral information for the model, comparing the extracted information and recalculated spectral information, and repeatedly adjusting the at least one parameter, recalculating spectral information, and comparing the extracted and recalculated information until an acceptable fit is achieved.

Scheiner et al. further teaches curve fitting comprising comparing extracted and calculated spectral information (fig. 5a, #58), adjusting at least one variable parameter of the model, recalculating spectral information for the model (fig. 5a, #60), comparing the extracted information and recalculated spectral information (fig. 5a, #58), and repeatedly adjusting the at least one parameter, recalculating spectral information, and comparing the extracted and recalculated information until an acceptable fit is achieved (fig. 5a, #64).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to further incorporate the apparatus of Rosencwaig et al. as modified above with the computer program for analysis of Scheiner et al., since one would be motivated to make such a modification for providing a system that enables the relative small amount of information representative of the structure's conditions to be obtained and successfully processed for even more complicated structures (col. 2, lines 34-38) as shown by Scheiner et al.

5. Regarding claim 9, Rosencwaig et al. further discloses a dispersing element and an array of detector pixels (col. 7, lines 38-44).

6. Regarding claims 10 and 15, Rosencwaig et al. further discloses a rotatable polarizing element (fig. 1, #122).

7. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rosencwaig et al., Finarov et al., and Scheiner et al. as applied to claim 3 above, and further in view of Solomon et al. (US Patent 5900633).

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Rosencwaig et al. as modified above suggests an apparatus as recited above.

However, Rosencwaig et al. does not disclose curve fitting using non-linear regression.

Solomon et al. teaches curve fitting using non-linear regression (col. 8, line 64, to col. 9, line 6).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the apparatus of Rosencwaig et al. as modified above with the non-linear regression of Solomon et al., since one would be motivated to make such a modification to better find a best fit between the extracted and simulated parameters iteratively and automatically (col. 8, line 64, to col. 9, line 6) as shown by Solomon et al.

8. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rosencwaig et al., Finarov et al., and Scheiner et al. as applied to claim 3 above, and further in view of Xu et al. (US Patent 5900633).

Rosencwaig et al. as modified above suggests an apparatus as recited above.

However, Rosencwaig et al. does not disclose rigorous coupled-wave analysis for modeling.

Xu et al. teaches rigorous coupled-wave analysis for modeling (col. 7, lines 40-51).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the apparatus of Rosencwaig et al. as modified above with rigorous coupled-wave analysis of Xu et al., since one would be motivated to make such a modification to reduce computation time (col. 7, line 20, to col. 8, line 12) as implied from Xu et al.

9. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosencwaig et al. in view of Finarov et al., Scheiner et al., and Motulsky (Analyzing Data with GraphPad Prism).

For purposes of being concise, Rosencwaig et al. as modified above suggests an apparatus as recited above.

However, Rosencwaig et al. does not disclose curve fitting with $R(\Theta) = A \cos^4(\phi - \Theta) + B \sin^4(\phi - \Theta) + C \cos^2(\phi - \Theta) \sin^2(\phi - \Theta)$, which is sum-of-squares with variables in non-linear regression.

Motulsky teaches curve fitting with sum-of-squares and variables in non-linear regression (pages 164-165).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the apparatus of Rosencwaig et al. as modified above with the curve fitting of Motulsky, since one would be motivated to make such a modification for better interpreting information (Page 157) as implied from Motulsky.

10. Claims 11, 12, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosencwaig et al., Finarov et al., and Scheiner et al. as applied to claim 13 above, and further in view of Shibata et al. (US Patent 6690469).

For purposes of being concise, Rosencwaig et al. as modified above suggests an apparatus and method as recited above.

However, Rosencwaig et al. does not disclose a rotating sample stage.

Shibata et al. teaches a rotating sample stage (Fig. 3, #3-6).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the apparatus and method of Rosencwaig et al. as modified above with the sample stage of Shibata et al., since one would be motivated to make such a modification for more maneuverability (Fig. 3, #3-6) as implied from Shibata et al.

11. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rosencwaig et al., Finarov et al., and Scheiner et al. as applied to claim 13 above, and further in view of Xu et al. (US Patent 6483580).

Rosencwaig et al. as modified above suggests a method as recited above.

However, Rosencwaig et al. does not disclose a reference database.

Xu et al. teaches a reference database (col. 3, lines 29-30).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Rosencwaig et al. as modified above with the reference database of Xu et al., since one would be motivated to make such a modification for better providing a means for comparing detected intensities to a database to determine one or more parameters of the object of inspection (col. 3, lines 26-40) as shown by Xu et al.

12. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rosencwaig et al. in view of Finarov et al. and Shibata et al.

For purposes of being concise, Rosencwaig et al. as modified above suggests an apparatus as recited above.

However, Rosencwaig et al. does not disclose a rotating sample stage.

Shibata et al. teaches a rotating sample stage (fig. 3, #3-6).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the apparatus of Rosencwaig et al. as modified above with the sample stage of Shibata et al., since one would be motivated to make such a modification for more maneuverability (fig. 3, #3-6) as implied from Shibata et al.

Response to Arguments

13. Applicants' arguments with respect to claims 3-16 and 28 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chih-Cheng Glen Kao whose telephone number is (571) 272-2492. The examiner can normally be reached on M - F (9 am to 5 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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